

where N is positively charged;

wherein $q = 1$ to 100,000, wherein when $q = 2$ to 100,000 each monomer of formula I may be the same as or different from the other monomers of formula I;

wherein Z may be the same as or different from Y;

wherein each Y and Z are independently selected from the group consisting of -OH, -NH₂, -SH, -PO₃H, -CO₂H, -SO₃H and hydrogen;

wherein f is an integer from 0 to 2, m is an integer from 0 to 20 and e is an integer from 0 to 2;

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COO⁺4.

wherein R_4 , R_5 , and R_6 may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, mercaptan, thiol, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, carbonyl, sulfonyl, sulfonic and amido groups, and d is an integer from 0 to 2;

wherein a , b , and c are independently an integer from 0 to 1, with the proviso that no more than two of a , b , and c are zero;

wherein R_1 , R_2 and R_3 may be the same or different and are independently selected from the group consisting of:

a) $=O$ and;

b) $(W)_g$

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$-(CR_7)_n$;

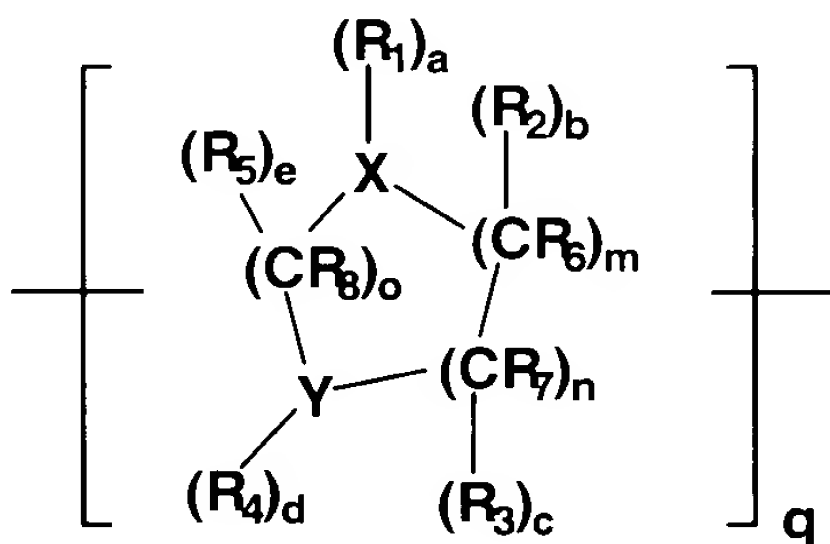
with the proviso that no more than two of A , R_1 , R_2 and R_3 are selected from the group consisting of hydrogen, methyl, ethyl and propyl; and

with the proviso that if one, and only one, of R_1 , R_2 and R_3 is $=O$, then A is none of hydrogen, methyl, ethyl and propyl;

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cont.

wherein each R_7 and W may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, thiol, mercaptan, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, carbonyl, sulfonyl, sulfonic and amido groups; g is an integer from 0 to 2 and n is an integer from 0 to 20, with the proviso that if two of R_1 , R_2 , and R_3 are $=O$, then the other is not $=O$;

Formula II:



wherein Formula II is saturated or unsaturated;

wherein $q = 1$ to 100,000, wherein when $q = 2$ to 100,000, each monomer of formula II may be the same as or different from each other monomer of formula II;

wherein X is selected from the group consisting of N, C, O, P and S;

wherein Y is selected from the group consisting of O, N, S, P, C, $-O-NH-$, $-O-CH_2-NH-$, $-O-CH_2-O-$, $-NH-CH_2-NH-$, $-O-CH(CH_3)-NH-$, $-NH-CH(CH_3)-NH-$, $-O-CH(CH_3)-O-$, $-NH-C(CH_3)_2-NH-$, $-O-S-$, $-O-CH_2-S-$, $-NH-S-$, $-NH-CH_2-S-$, and

other mercaptan, phosphato, alkoxy, oxide, ether, esters (alkanoyloxy), carboxy, sulfonyl, sulfonic and amido groups;

with the proviso that if either X or Y is N, then the other is not C;

wherein R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , R_7 and R_8 may be the same or different and are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, aryl, amino, thiol, mercaptan, halo, nitro, nitrilo, hydroxy, hydroxyalkyl, hydroxyaryl, phosphato, alkoxy, oxide, ether, ester (alkanoyloxy), carboxy, sulfonyl, sulfonic and amido groups; and

wherein a, b, c, d, e, m, n and o are integers which may be the same or different and are independently selected from 0 to 2 for a, b, c, d, and e, and 0 to 5 for m, n and o.
